

Research Notes

Program Steering Committee (PSC): Pavement

June 2014

Title: Pavement Reconstruction Scheduling Software (CA4PRS): Pooled Fund SPR-3(098)

Task Number: 0375

Start Date: 10/01/2000

Completion Date: 06/30/2014

Task Manager:

Michael Samadian, Senior Transportation Engineer

michael.m.samadian@dot.ca.gov

TITLE:

Pavement Reconstruction Scheduling Software (CA4PRS): Pooled Fund SPR-3(098)

WHAT IS THE NEED?

State transportation agencies are increasingly shifting their focus from constructing new highways to rehabilitating and reconstructing existing facilities. Because highway rehabilitation projects often cause congestion, safety problems, and limited access for road users, agencies face a challenge in finding economical ways to rehabilitate deteriorating roadways, especially in urban areas, while keeping the traveling public as safe as possible and minimizing disruptions for local communities and surrounding businesses.

However, it is not a simple task to select the most economic alternatives for a given roadway rehabilitation project as engineers should consider many different factors, such as materials, pavement types, construction logistics, cost and traffic delay. This process requires accurate data inputs and calculations, and also it is a time-consuming process. In traditional manual design procedures, therefore, only a limited number of alternatives were compared before selecting the final alternative.

To overcome this issue, there is a need for the development of a systematic, computer-aided tool for construction, traffic and cost analysis that may assist engineers and planners to find the most cost-effective alternatives for various roadway rehabilitation projects.

WHAT ARE WE DOING?

One innovation in the effort to reduce highway construction time and its impact on traffic is software called CA4PRS, Construction Analysis for Pavement Rehabilitation Strategies. CA4PRS is a construction schedule, traffic and cost analysis tool that helps engineers select the most cost-effective rehabilitation strategies. CA4PRS was developed earlier in 2004 through this pooled-fund project by the University of California, Pavement Research Center (UCPRC).

Many case studies in California and other states have proved the capabilities and benefits of CA4PRS. FHWA formally endorsed CA4PRS as a "Priority, Market-Ready Technologies and

Innovations" product in 2008 for national wide deployment, and arranged the CA4PRS group license for all 50 state DOTs, as an extension of the pooled fund project.

The extension also aimed the software upgrade to newer versions that would be applicable to the analysis of different types of roadway rehabilitation projects, such as pre-cast concrete pavement rehabilitation and roadway widening.

WHAT IS OUR GOAL?

The objective of the study is to develop and maintain a software simulation tool which can be used to consider roadway rehabilitation design options along with construction scheduling, resource constraints, traffic management, and user-delays.

WHAT IS THE BENEFIT?

The software's scheduling module estimates highway project duration (total number of closures), incorporating alternative strategies for pavement designs, lane-closure tactics, and contractor logistics. Total agency construction cost is also estimated by the cost analysis module. CA4PRS's traffic module quantifies the impact of construction work zone closures on the traveling public in terms of road user cost and time spent in queue.

The use of CA4PRS is especially beneficial for transportation agencies when it is implemented during the planning and design stages of highway project development in order to balance schedule (construction production), inconvenience (traffic delay), and affordability (agency budget).

WHAT IS THE PROGRESS TO DATE?

The latest extension of the pooled fund project aimed to upgrade the software for the following newer versions that will have analytical capabilities for the respective different project types:

- Version 2.5: Pre-cast concrete pavement rehabilitation project,
- Version 3.0: Roadway widening project,
- Version 3.5: Bridge replacement project, and
- Version 4.0: Automated interaction with life-cycle analysis program.

So far, the software upgrade to 3.0 has been completed. The software's online training modules were also developed and the online training modules for the latest version 3.0 of CA4PRS are posted in the Division of Research, Innovation and System Information's public website at:

http://www.dot.ca.gov/newtech/roadway/ca4prs/ca4prs_software/ca4prs_training_modules/index.htm.

However, tasks for the upgrade to the next two versions 3.5 and 4.0 will be canceled and the project will be closed due to limited availability of the principal investigator of the project. The principal investigator has permanently left the US in 2012 for his new career in South Korea, and as a result, he won't be able to carry out his commitment fully in timely manner.